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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/681,846	10/08/2003	Qingchong Liu		7111

7590 08/05/2008

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EXAMINER	
PANWALKAR, VINEETA S	
ART UNIT	**PAPER NUMBER**
2611	
MAIL DATE	**DELIVERY MODE**
08/05/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	**Application No.** 10/681,846	**Applicant(s)** LIU, QINGCHONG
	Examiner VINEETA S. PANWALKAR	**Art Unit** 2611

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _09 April 2008_.
2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-31_ is/are pending in the application.
  4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) _1-31_ is/are rejected.
7)☐ Claim(s) _____ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.
10)☒ The drawing(s) filed on _08 October 2003_ is/are: a)☒ accepted or b)☐ objected to by the Examiner.
  Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
  Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  a)☐ All b)☐ Some * c)☐ None of:
    1.☐ Certified copies of the priority documents have been received.
    2.☐ Certified copies of the priority documents have been received in Application No. _____.
    3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
  * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
  Paper No(s)/Mail Date _5/29/08_.
4) ☐ Interview Summary (PTO-413)
  Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claims are objected to because of the following informalities:

1a. It is suggested that “the encoder” in line 1 of claim 2 be replaced by -- an encoder --.

1b. It is suggested that, “the modulator” in line 1 of claim 3 be replaced by -- a modulator--.

1c. It is suggested that, “the sampling circuit" in line 1 of claim 13 be replaced by --a sampling circuit --.

1d. It is suggested that, “the shaping filters” in line 2 of claim 14 be replaced by -- shaping filters – and “the shaping filter” in line 3 of claim 14 be replaced by -- the shaping filters --.

1e. It is suggested that “the prestored waveforms” in line 2 of claim 15 be replaced by -- prestored waveforms--.

1f. It is suggested that “the correlators" in line 2 of claim 16 be replaced by -- correlators --.

1g. It is suggested that “the iterative" in lines 1 and 2 of claim 19 be replaced by –an iterative -- and “ the maximum” and “ the block” in line 2 of the claim be replaced by -- a maximum -- and -- a block --.

1h. It is suggested that “the channel, the decoding” in line 3 of claim 20 be replaced by -- the channel and the decoding --.

1i. It is suggested that “Two shaping filters as recited in claim 22,” in lines 1 of claims 23 and 24, be replaced by – The method of claim 22, wherein said first and second filters are first and second pulse shaping filters respectively, --.

1j. Claim 25 claims “a modulator for implementing phase shift keying as recited in claim 22” in line 1 of the claim. However, claim 22 does not claim a modulator and fails to mention “phase shift keying”. Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1-31 rejected as failing to define the invention in the manner required by 35 U.S.C. 112, second paragraph.

The claim(s) are narrative in form and replete with indefinite and functional or operational language. The structure which goes to make up the device must be clearly and positively specified. The structure must be organized and correlated in such a manner as to present a complete operative device. The claim(s) must be in one sentence form only. Note the format of the claims in the patent(s) cited.

2a. It is unclear how the claimed (as per claims 1 and 28) "means for simplifying the processes of design, development and manufacturing of power amplifiers, up-converters, mixers, RF circuits, radio terminals, communications terminals and radar” actually simplify design, development and manufacturing of said components, since there appears to be no mention of manufacturing of said components in the specification.

2b. Claim 5 is indefinite because it claims “functions including but not limited to”. The specification does not define which other functions may be included besides the ones listed in the claim. Hence, specification does not disclose the limitation “but not limited to”.

2c. There appears to be no mention of method for testing power amplifier (as claimed in claim 28), method for reducing linear range and number of stages for linearity in the power amplifier (as claimed in claim 28) or method for increasing reliability (as claimed in claims 1 and 29) in the specification .

2d. There appears to be no mention of an analog-to-digital converter to convert the sampled baseband signals to digital signals (as claimed in claim 27) in the specification. Since only a sampler is mentioned, the analog-to-digital converter to convert the sampled baseband signals to digital signals is interpreted as being the same as claimed sampling circuit of claim 27. Further, there appears to be no mention in the specification as per claim 27, that the claimed filters perform low-pass filtering for the samples in the in-phase and quadrature-phase channels.

2e. Claims 2-21 and 27-31 are rejected under second paragraph of 35 U.S.C. 112 as being dependent on claim 1.

2f. Claim 22 is a “method for minimizing distortion”. However, the claimed steps do not conclude how the distortion is minimized based on said steps.

2g. Claim 24 is indefinite for claiming “any function satisfying the condition in claim 23”. The specification does not define what qualifies as "any function". Further, it is unclear from the claim language of claim24, which condition in claim 23 is being referred to. It is suggested that "in claim 23" in line 4 of claim 24 be replaced by the actual condition that the applicant intends to claim.

2h. Claims 23-26 are rejected under 35 U.S.C. 112, second paragraph, as being dependent on claim 22.

However, hereinafter, claims have been interpreted and rejected, as best understood by examiner.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

3. Claims 22-25 are rejected under 35 U.S.C. 102(a) as being anticipated by Liu et al., “Quasi-Constant Envelope OQPSK Through Non-Linear Radio and AWGN channel”, Proceedings of IEEE MILCOM, 7-10 Oct 2002, vol. 1, pp. 715-720, hereinafter, Liu.

3a. Regarding claim 22, Liu discloses a method for minimizing the distortion caused by at least one saturated power amplifier or up-converter or RF circuit to phase modulated signals, the method comprising:

- mapping k bits d = (d1, d2,....dk) at a time to one of $M=2^k$ phases, the mapped phase is φ(d), which is a symbol (Fig. 1, page 717 and first paragraph under section II (System Model), pages 715 and 716, wherein OQPSK modulated symbol inherently is mapped to one of $M=2^k$ phases);
- feeding the coefficient cos φ(d) to a first finite impulse response filter for summing a series of delayed filter coefficients weighted by the symbol coefficients cos φ(d) to form the filtered in-phase signal (Fig. 1, page 717 and first paragraph under section II (System Model), pages 715 and 716); and
- feeding the coefficient sin φ(d) to a first finite impulse response filter for summing a series of delayed filter coefficients weighted by the symbol coefficients sin φ(d) to form the filtered quadrature-phase signal (Fig. 1, page 717 and first paragraph under section II (System Model), pages 715 and 716).

3b. Regarding claim 25, Liu discloses all the limitations claimed.

Liu further discloses a method wherein there is a modulator implementing phase shift keying, the envelope of the modulated signal not being constant. (Paragraphs 3-5 under section III (Filter Design and Power Spectral Density), page 717, wherein quasi-constant envelope OQPSK is interpreted as being claimed non-constant envelope phase shift keying modulated waveform. Also see Fig. 1 and paragraphs 1, 7 and 8 under section II (System Model), pages 715 and 716).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-14, 19-21 and 28-31 rejected under 35 U.S.C. 103(a) as being unpatentable over Liu in view of Feher (US 6470055 B1), hereinafter, Feher.

4a. Regarding claims 1, 28, 29, 30 and 31, Liu discloses a signal and information transmission system (Fig. 1, page 717) and a method for communications or radar overcoming the distortion that can be caused by RF circuits including any of power amplifiers or up-converters or mixers or by the channel, the system comprising:

- means for constructing phase modulated signals which can tolerate the distortion caused by the saturation of power amplifiers or the distortion caused by RF circuits such as up-converters and mixers or the channel; means for minimizing the distortion caused by saturated power amplifiers and

RF circuits to phase-shift-keyed signals at the output of one saturated power amplifier or many saturated power amplifiers or RF circuit (See Figs. 1 and 2 and section III (Filter design and power spectral density) on pages 716 and 717, wherein OQPSK (claimed phase shift keyed signals) modulated signal is interpreted as being produced by claimed means for constructing phase modulated signal and since the smoothed baseband signal can tolerate non-linearity caused by the saturated power amplifier, it is interpreted as tolerating and minimizing distortion caused by saturated power amplifier);

- means for employing power amplifiers working in the saturated region for signal power amplification or transmission (Fig. 1);
- means (and corresponding method as per claim 28) for simplifying the processes of design, development and manufacturing of power amplifiers, up-converters, mixers, RF circuits, radio terminals, communications terminals and radar (Fig. 1 shows the use of a simple RF circuit and hence this it is interpreted as comprising claimed means for simplifying);
- means (and corresponding method as per claim 30) for reducing the radio cost, power amplifier cost, up-converter cost, mixer cost and terminal cost (Page 720, Section IV (Conclusion));
- means for achieving high spectral efficiency in the presence of distortion caused by power amplifiers, up-converters, mixers and RF circuits (Page 720, Section IV (Conclusion), wherein high bandwidth efficiency is interpreted as high spectral efficiency);

- means for simplifying the terminal design, development and manufacturing (Fig. 1 shows the use of a simple RF circuit and hence this it is interpreted as comprising claimed means for simplifying);
- means (and corresponding method as per claim 29) for increasing the reliability of radio terminals (Page 720, Section IV (Conclusion), wherein optimal bit error performance and high bandwidth efficiency technologies are interpreted as providing increased reliability);
- means for filtering the received signal with distortion and noise by filters that are matched to the filters in the transmitter (Fig. 1, page 716, last paragraph under section II (System Model));
- means for detecting received signal; means for estimating parameters in the received signal (Fig. 1, and page 719, paragraph 3 under section C (Phase Error Effect));
- means for tracking the received signal in the presence of distortion and noise (Fig. 1, and page 719, section C (Phase Error Effect)); and
- means for achieving the bit error rate performance which is almost the same as the ideal linear BPSK bit error rate when power amplifier working in the saturated region is employed (See Figs. 3-5 and section A (Coherent Demodulation) on pages 718 and 719, especially fourth paragraph under section A).

Thus, Liu discloses all the limitations claimed, but fails to explicitly disclose claimed error correcting codes whether the power amplifier employing means may employ any of class-C, class-D, class-E, or class-F power amplifiers, or class-A, class-B, class-AB amplifiers and whether the battery life is increased.

In the same field of endeavor, however, Feher discloses a transmission system employing saturated power amplifiers, the system comprising:

- means for using error correcting codes to combat both the distortion caused by either RF circuits including power amplifiers and up-converters and mixers or the channel and the noise at the same time (Fig. 1B, unit 120 uses forward error correcting codes. See column 14, lines 20-35. Forward error correcting codes inherently combat distortion caused by channel and noise);
- means for employing any of class-C, class-D, class-E, or class-F power amplifiers, or class-A, class-B, class-AB power amplifiers working in the saturated region for signal power amplification or transmission (Column 13, lines 55-58);
- means (and method as per claim 31) for increasing the battery life for communication terminals operated on battery (Column 6, lines 20-36, wherein power efficient amplifiers in saturated mode are interpreted as increasing battery life) and
- means for demodulating the received signal using the error correcting codes (Fig. 30, FEC decoder 30.17).

Thus, it would have been obvious to a person of ordinary skill in the art to use Feher's method of employing forward error correction codes because forward error correction codes helps combat distortion caused by channel.

4b. Regarding claim 2, Liu and Feher discloses all the limitations claimed.

Feher further discloses a system, comprising the encoder for error correcting codes to add redundancy to the information bits by applying turbo code, convolutional code, block code, or low density parity check code to combat the distortion caused by power amplifiers and RF circuits or the channel and to overcome the noise in the channel (Column 33, lines 9-15).

Thus, it would have been obvious to a person of ordinary skill in the art to use Feher's method of employing forward error correction codes because forward error correction codes helps combat distortion caused by channel.

4c. Regarding claim 3, Liu and Feher discloses all the limitations claimed.

Feher further discloses a system, comprising the modulator to take the input data stream and map the input data to the corresponding phase using the Gray coding for M-ary phase shift keying, M>=2, and variations of phase shift keying (Column 30, lines 25-43).

Thus, it would have been obvious to a person of ordinary skill in the art to employ Feher's Gray coding for the phase shift keying because it is known that Gray codes reduce the probability of dual-bit errors because only one of the two bits changes at each transition between voltage levels.

4d. Regarding claim 4, Liu and Feher discloses all the limitations claimed.

Liu further shows a system, wherein said modulator constructs the modulated waveforms in orthogonal channels using finite impulse response filters (Fig. 1, paragraph one under section II (System Model), pages 715 and 716 and paragraph two under section III (Filter Design and Power Spectral Density), pages 716 and 717).

4e. Regarding claim 5, Liu and Feher disclose all the limitations claimed.

Liu further shows a system wherein said modulator uses pulse shaping functions including the square-root raised cosine function (paragraph one under section III (Filter Design and Power Spectral Density), page 716).

Thus, Liu and Feher disclose all the limitations claimed, but fail to explicitly disclose whether filter may use raised cosine function, and functions of Hanning, Hamming and Blackman.

However, the use of filters using Hanning, Hamming and Blackman and Park raised cosine functions is well known in the art.[1]

Thus, it would have been obvious to one of ordinary skill in the art to use filters using different well known functions based on desired pulse shape.

4f. Regarding claim 6, Liu, Feher, disclose all the limitations claimed.

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[1] Refernces showing use of filters using Hanning, Hamming and Blackman and Park raised cosine functions:

- Korol et al. (US 20030021357 A1)
- Park (US 7103111 B2)

Liu further discloses a system wherein said modulator constructs the linearly modulated waveforms of phase shift keying which do not have constant envelope in orthogonal channels (Paragraphs 3-5 under section III (Filter Design and Power Spectral Density), page 717, wherein quasi-constant envelope OQPSK is interpreted as being claimed linearly modulated waveforms of phase shift keying which do not have constant envelope in orthogonal channels. Also see Fig. 1 and paragraphs 1, 7 and 8 under section II (System Model), pages 715 and 716).

4g. Regarding claim 7, Liu and Feher disclose all the limitations claimed.

Liu further shows a system wherein said modulator generates waveforms to minimize the distortion after being amplified by power amplifiers working in the saturation region (Paragraph 3 under section III ((Filter Design and Power Spectral Density), page 717).

Also, Feher discloses the use of class-C power amplifiers (Column 13, lines 55-58);

Thus, it would have been obvious to a person of ordinary skill in the art to use power amplifiers of class C as suggested by Feher or any of the other known classes (A, B, AB, D, E, or F) depending on desired efficiency and linearity characteristics.

4h. Regarding claim 8, Liu and Feher disclose all the limitations claimed.

Feher further shows a system wherein said modulator constructs waveforms to minimize the distortion after being transmitted through the channel (Fig. 1B, unit 120 uses forward error correcting codes in combination with modulation. See column 14, lines 20-35. Forward error correcting codes inherently combat distortion caused by channel and noise)).

Thus, it would have been obvious to a person of ordinary skill in the art to use Feher's method of employing forward error correction codes because forward error correction codes helps combat distortion caused by channel

4i. Regarding claim 9, Liu and Feher disclose all the limitations claimed.

Liu further discloses system comprising up-converter and power amplifier to convert the baseband signal to the signal centered at the carrier frequency and to amplify the signal (Fig. 1, page 717 and first paragraph under section II (System Model), pages 715, 716).

4j. Regarding claim 10, Liu and Feher disclose all the limitations claimed.

Liu further shows a system wherein said modulator generates waveforms to minimize the distortion after being amplified by power amplifiers working in the saturation region (Paragraph 3 under section III ((Filter Design and Power Spectral Density), page 717).

Also, Feher discloses the use of class-C power amplifiers (Column 13, lines 55-58);

Thus, it would have been obvious to a person of ordinary skill in the art to use power amplifiers of class C as suggested by Feher or any of the other known classes (A, B, AB, D, E, or F) depending on desired efficiency and linearity characteristics, since the amplifiers are known to have high DC-to-AC power conversion efficiency.

4k. Regarding claim 11, Liu and Feher disclose all the limitations claimed.

Feher further shows a system comprising an antenna or multiple antennas for transmission and reception of the signal (Figs. 32A and 32B and column 36, lines 23-40).

Thus, it would have been obvious to a person of ordinary skill in the art to use Feher's method of using antennas for transmission and reception so as to transmit signal over a wireless channel.

4l. Regarding claim 12, Liu and Feher disclose all the limitations claimed.

Liu also shows a system, comprising a down-converter to convert the received signal to baseband ((Fig. 1, page 717 and first paragraph under section II (System Model), pages 715, 716. Down-conversion is inherently performed prior to filtering in the receiver in order to convert received signal to baseband and demodulate it).

4m. Regarding claim 13, Liu and Feher disclose all the limitations claimed.

Liu further shows system comprising the sampling circuit to sample the received signal (Fig, 1, page 717, paragraph one under section IV (Demodulation and Performance), pages 717 and 718).

4n. Regarding claim 14, Liu and Feher disclose all the limitations claimed.

Liu further shows system comprising filters in the receiver which are matched to the shaping filters in the transmitter or to the convolution of the impulses response functions of the shaping filter and the power amplifier and the RF circuits in the transmitter (Fig. 1, page 716, last paragraph under section II (System Model)).

4o. Regarding claim 19, Liu and Feher disclose all the limitations claimed.

Liu further shows system comprising a decoder which can be the iterative decoder, the maximum likelihood decoder or the block decoder (Section B (Timing Error Effect), page 719, discloses maximum likelihood decoding).

4p. Regarding claim 20, Liu and Feher disclose all the limitations claimed.

Liu further shows system wherein said decoder overcomes the distortion caused by power amplifiers or up-converters or RF circuits in the transmitter or by the channel and combats the noise in the channel, the decoding algorithm is optimal to the noise distribution (Section V (Coded Performance), pages 719 and 720).

4q. Regarding claim 21, Liu and Feher disclose all the limitations claimed.

Liu further shows system as recited, comprising a decoder which can achieve optimal or near optimal bit error rate performance in the presence of both distortion caused by RF circuits including the power amplifiers and the up-converters and mixers or by the channel, and noise such as AWGN (Section V (Coded Performance), pages 719 and 720).

5. Claims 15-18 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liu in view Feher as applied to claim 1 above, and further in view of Coulson et al. (US 20030156534 A1), hereinafter, Coulson.

5a. Regarding claim 15, Liu and Feher disclose all the limitations claimed. Liu further discloses packet detection (Paragraph 3 under section C. (Phase Error Effect), page 719), but fails to explicitly disclose claimed correlators.

However, in the same field of endeavor, Coulson shows a system comprising correlators to correlate the received signal in orthogonal channels with the prestored waveforms or signals (paragraph [0065], wherein correlators are used for packet detection suing pilot symbols which are inherently prestored).

Thus, it would have been obvious to a person of ordinary skill in the art to use correlators as shown by Coulson in order to accurately detect the packet.

5b. Regarding claim 16, Liu and Feher disclose all the limitations claimed.

Liu further discloses packet detection (Paragraph 3 under section C. (Phase Error Effect), page 719), but fails to explicitly disclose claimed correlators. However, in the same field of endeavor, Coulson shows a system comprising correlators to correlate the received signal and use it for packet detection (paragraph [0065], wherein correlators are used for packet detection).

Thus, it would have been obvious to a person of ordinary skill in the art to use correlators as shown by Coulson in order to accurately detect the packet.

5c. Regarding claim 17, Liu and Feher disclose all the limitations claimed.

Liu further discloses parameter estimation (Paragraph 3 under section C. (Phase Error Effect), page 719), but fails to explicitly disclose claimed correlators. However, in the same field of endeavor, Coulson shows use of correlators to detect packet and parameter estimators to estimate carrier frequency, phase and symbol timing using outputs (paragraphs [0063] - [0065], wherein correlators are used for packet detection and initial estimates for time, frequency and phase error are provided).

Thus, it would have been obvious to a person of ordinary skill in the art to use correlators as shown by Coulson in order to accurately detect the packet.

5d. Regarding claim 18, Liu and Feher disclose all the limitations claimed.

Liu further discloses parameter estimation and tracking loop (Paragraph 3 under section C. (Phase Error Effect), page 719), but fails to explicitly disclose details about tracking loop.

However, in the same field of endeavor, Coulson shows use comprising a tracking loop which uses the estimated carrier frequency, phase and symbol timing in the initialization of the loop to track the signal (paragraphs [0063] - [0065], wherein PLL 17 is claimed tracking loop).

Thus, it would have been obvious to a person of ordinary skill in the art to use tracking loop as shown by Coulson in order to accurately track the data.

5e. Regarding claim 27, Liu and Feher show all the limitations claimed.

Liu further shows the system further comprising a demodulator to demodulate the received signal in the presence of both distortion and noise, the demodulator comprising:

- a first down-converter to convert the received signal in the in-phase channel to baseband; a second down-converter to convert the received signal in the quadrature channel to baseband (((Fig. 1, page 717 and first paragraph under section II (System Model), pages 715, 716. Down-conversion is inherently performed to both, signal in the in-phase channel and signal in the quadrature phase channel (See Fig. 1, page 717), prior to filtering in the receiver in order to convert received signal to baseband and demodulate it).

- a sampling circuit to sample the baseband signals in both the in-phase channel and the quadrature channel and an analog-to-digital converter to convert the sampled baseband signals to digital signals; (Fig. 1, page 717 shows sampling being performed on both the in-phase channel and the quadrature channel);
- a first finite impulse response filter matched to the shaping filter for the in-phase channel in the transmitter, a second finite impulse response filter matched to the shaping filter for the quadrature channel in the transmitter, (Fig. 1, page 716, last paragraph under section II (System Model) and first paragraph under section IV (Demodulation Performance),pages 717 and 718. Although the filters do not operate on sampled in-phase and quadrature phase signals, it would have been obvious to a person of ordinary skill in the art to perform filtering after the sampling circuit in order to use digital filters instead of the analog filters shown by Liu because it is well known that it is easier and cheaper to adaptively adjust filter characteristics of digital filters);
- a signal detector to detect the incoming signal using the matched filter output; a parameter estimator to estimate the symbol timing, carrier frequency offset and carrier phase using the matched filter output; (Paragraph 3 under section C. (Phase Error Effect), page 719, wherein packet detection is interpreted as being performed by claimed signal detector);
- tracking loop (Paragraph 3 under section C. (Phase Error Effect), page 719); and

- a decoder to make decisions on the received symbol using tracking loop output (Section B (Timing Error Effect), page 719, discloses maximum likelihood decoding).

Further, Feher discloses:

- filter performing low-pass filtering for signal in the in-phase channel (Fig. 6B, filter 6.26; column 20, lines 11-15);
- filter performing low-pass filtering for the signals in the quadrature channel (Fig. 6B, filter 6.27; column 20, lines 11-15);

Thus, it would have been obvious to a person of ordinary skill in the art to use Feher's low pass filtering to remove high frequency noise.

Thus, Feher and Liu disclose all the limitations claimed, but fail to explicitly disclose whether the parameter estimates estimate the symbol timing, carrier frequency offset and carrier phase and details about tracking loop.

However, in the same field of endeavor, Coulson shows parameter estimators to estimate carrier frequency, phase and symbol timing using outputs (paragraphs [0063] - [0065], wherein initial estimates for time (claimed symbol timing), frequency and phase error are provided and wherein PLL 17 is claimed tracking loop).

Thus, it would have been obvious to a person of ordinary skill in the art to use Coulson's parameter estimation and tracking loop in order to accurately detect the packet.

6. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Liu.

6a. Regarding claim 24, Liu discloses all the limitations claimed.

Liu further shows a system wherein using shaping filters pulse shaping functions including the square-root raised cosine function with roll off factor close to 1.0 (paragraphs one-three under section III (Filter Design and Power Spectral Density), pages 716 and 717).

Thus, Liu discloses all the limitations claimed, but fail to explicitly disclose whether filter may use raised cosine function, and functions of Hanning, Hamming and Blackman.

However, the use of filters using Hanning, Hamming and Blackman and Park raised cosine functions is well known in the art (See footnote one above).

Thus, it would have been obvious to one of ordinary skill in the art to use filters using different well known functions based on desired pulse shape.

7. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Liu in view of Sohner et al. (US 5025452), hereinafter, Sohner.

7a. Regarding claim 26, Liu discloses all the limitations claimed, including a power amplifier (Fig. 1, page 717), but fails to explicitly disclose claimed pulse shaping filter for reducing sidelobe regrowth at the output pf power amplifier.

In the same field of endeavor, however, Sohner discloses system employing a filter for reducing sidelobe regeneration (claimed regrowth) at the output pf power amplifier (Fig. 3, filter 68, column 8, lines 32-39).

Thus, it would have been obvious to a person of ordinary skill in the art to employ a filter at the output of power amplifier as disclosed by Sohner so as to reduce sidelobe regeneration and remove any unwanted signals (column 8, lines 32-39).

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

- Park et al. (US 6373879 B1) disclose OQPSK modulation with FIR filters for preventing sidelobe regrowth caused by power amplifier.

Contact Information

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to VINEETA S. PANWALKAR whose telephone number is (571)272-8561. The examiner can normally be reached on M-F 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad Ghayour can be reached on 571-272-3021. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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